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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/675,023 09/28/00 BURTON

R 60944.3300

020322
SNELL & WILMER
ONE ARIZONA CENTER
400 EAST VAN BUREN
PHOENIX AZ 85004-0001

MM91/0918

EXAMINER

LEE, H

ART UNIT

PAPER NUMBER

2823

DATE MAILED:

09/18/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

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Office Action Summary

Application No.

09/675,023

Applicant(s)

BURTON ET AL.

Examiner

Hsien-Ming Lee

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-44 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Oath/Declaration

1. It does not identify the post office address of one of inventors, i.e. Richard S. Burton. A post office address is an address at which an inventor customarily receives his or her mail and may be either a home or business address. The post office address should include the ZIP Code designation.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 7-13, 21-28 and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Murakami et al. (US 4,796,082).

Referring to fig. 2 (c) and related text, Murakami et al. identically teach the claimed method comprising:

- (a) depositing a reactive layer 18 comprising electrically conductive material (In-Ni) and an adhesive element on at least a portion of a compound semiconductor layer 20 (InGaAs); and
- (b) depositing a refractory layer 16 comprising electrically conductive material (Ti/TiN), wherein the Ti is considered as an adhesive element.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who

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has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

5. Claims 1-5, 9-10, 14-15, 18-21, 24-25, 29-30, 32-34, 43 are rejected under 35

U.S.C. 102(e) as being anticipated by Yagura et al. (US 6,188,137).

Referring to fig. 10 and related text Yagura et al. teach the claimed method as well as claimed ohmic contact, comprising:

- (a) depositing a reactive layer 5/41 comprising electrically conductive material (WSi) and an adhesive element (Ti) on at least a portion of a compound semiconductor layer 2 ($\text{In}_x\text{Ga}_{1-x}\text{As}$, wherein $0 < x < 1$; or $x = 0.66$; col. 4, line 12); and
- (b) depositing a refractory layer 42 comprising electrically conductive material (Pt).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 6, 16, 17, 31, 35-42 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. (US 4,796,082) in view of Yagura et al. ('137).

Referring to fig. 2(c) and related text, Murakami et al. teach the claimed method for forming an ohmic contact on a compound semiconductor layer of a semiconductor device comprising:

- (a) depositing a reactive layer 18 (In-Ni) comprising nickel on at least portion of a compound semiconductor layer 20 (InGaAs) of a semiconductor device; and

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(b) depositing a refractory layer 16 on said reactive layer 18, said refractory layer 16 comprising titanium and substantially free of gold such as Ti and TiN (col. 3, lines 30-41).

Murakami et al. do not expressly teach : (1) the specific thickness of said reactive layer as well as refractory layer; and (2) said compound semiconductor layer comprises either $\text{In}_x\text{Ga}_{1-x}\text{As}$ or InAs.

Yagura et al. ('137) in an analog art of forming an ohmic contact teach utilizing $\text{In}_x\text{Ga}_{1-x}\text{As}$ as a compound semiconductor layer, wherein $0 < x < 1$; or $x = 0.66$ (col. 1, line 18; col. 4, line 12).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply the teaching of Yagura to Murakami's method, since it is the art recognized equivalence for the same purpose.

As far as the specific thickness is concern, the selection of the thickness of the reactive layer as well as the refractory layer is obvious because it is a matter of determining optimum process condition by routine experimentation. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious).


As far as utilizing InS as a compound semiconductor layer is concern, it is a well-known practice in the field and considered as an art recognized equivalence for the same purpose of InGaAs.

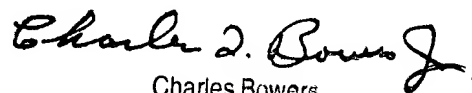
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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (7:00 ~ 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned is 703-305-0142.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Hsien Ming Lee
September 15, 2001


Charles Bowers
Supervisor Patent Examiner
Technology Center 2800